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MACTEC ENVIRONMENTAL RESTORATION SERVICES, LLC

Spectral Gamma-Ray Borehole
Log Data Report

Log Event A

Borehole 10-00-07

Borehole Information

Farm :	A	**Tank :**	A	**Site Number :**	299-E24-14
N-Coord :	41,125	**W-Coord :**	47,799	**TOC Elevation :**	691.31
Water Level, ft :	290.50	**Date Drilled :**	7/31/69		

Casing Record

Type :	Steel-welded	Thickness, in. :	0.280	ID, in. :	6
Top Depth, ft. :	0	Bottom Depth, ft. :	208		
Type :	Steel-welded	Thickness, in. :	0.250	ID, in. :	4
Top Depth, ft. :	0	Bottom Depth, ft. :	200		

Cement Bottom, ft. : 200 **Cement Top, ft. :** 0

Borehole Notes:

A driller's log was not located for this borehole. Chamness and Merz (1993) indicate this borehole was installed in July 1969 to a depth of 338 ft. The borehole was apparently perforated from 338 to 270 ft. The surface exposure of the borehole indicates the presence of a 4-in. and a 6-in. pipe. The logging engineer lowered a treble hook to determine whether there were obstructions in the borehole. As the treble hook was being returned to the ground surface, an obstruction was encountered at about 200 ft. However, the 6-in. casing probably does not terminate at 200 ft.

The top of the casing is the zero reference for the log. The casing lip is approximately 6 in. above the ground surface.

Equipment Information

Logging System :	2	**Detector Type :**	HPGe	**Detector Efficiency:**	35.0 %
Calibration Date :	10/1996	**Calibration Reference :**	GJO-HAN-13	**Logging Procedure :**	P-GJPO-1783

Logging Information

Log Run Number :	1	**Log Run Date :**	01/10/1997	**Logging Engineer:**	Bob Spatz
Start Depth, ft.:	0.5	**Counting Time, sec.:**	100	**L/R :** L **Shield :**	N
Finish Depth, ft. :	87.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Log Run Number :	2	**Log Run Date :**	01/13/1997	**Logging Engineer:**	Bob Spatz
Start Depth, ft.:	202.0	**Counting Time, sec.:**	100	**L/R :** L **Shield :**	N
Finish Depth, ft. :	140.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

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Log Run Number :	3	**Log Run Date :**	01/14/1997	**Logging Engineer:**	Bob Spatz
Start Depth, ft.:	141.0	**Counting Time, sec.:**	100	**L/R :** L	**Shield :** N
Finish Depth, ft. :	86.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Logging Operation Notes:

This borehole was logged in three log runs. Water was encountered in the borehole at 290.5 ft. The total logging depth achieved by the SGLS was 202 ft.

Analysis Information

Analyst : S.D. Barry

Data Processing Reference : MAC-VZCP 1.7.9 Analysis Date : 02/20/1998

Analysis Notes :

The pre- and post-survey field verification spectra for all logging runs met the acceptance criteria established for peak shape and system efficiency. The energy calibration and peak-shape calibration from these spectra were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during the logging operation.

The thickness and density of the grout could not be determined; therefore, a correction for the attenuating effects of the grout could not be determined.

Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations. Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.

Results/Interpretations:

The man-made radionuclides Cs-137, Co-60, and Eu-154 were detected around this borehole. Cs-137 contamination was detected nearly continuously from the ground surface to 14 ft and continuously from 22 to 23.5 ft. Co-60 contamination was detected from 1.5 to 4 ft. Eu-154 contamination was measured from 2.5 to 4.5 ft.

The K-40 log plot shows a slight increase in concentrations at 60 and 120 ft. The U-238 concentration values decrease sharply between depths of 87 and 140 ft. This decrease in U-238 concentration corresponds with logging run 3 and probably indicates some sort of problem with the measurement of the 609 keV peak used to

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calculate the U-238 concentration. The exact cause of the erroneous measurements was not determined because it is unlikely that this borehole can be used for correlation of lithology. The U-238 log plot shows that the U-238 concentration is elevated above normal values in the interval from 140 and 170 ft; however, the measured U-238 concentrations may be invalid throughout this interval as well.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank A-101.